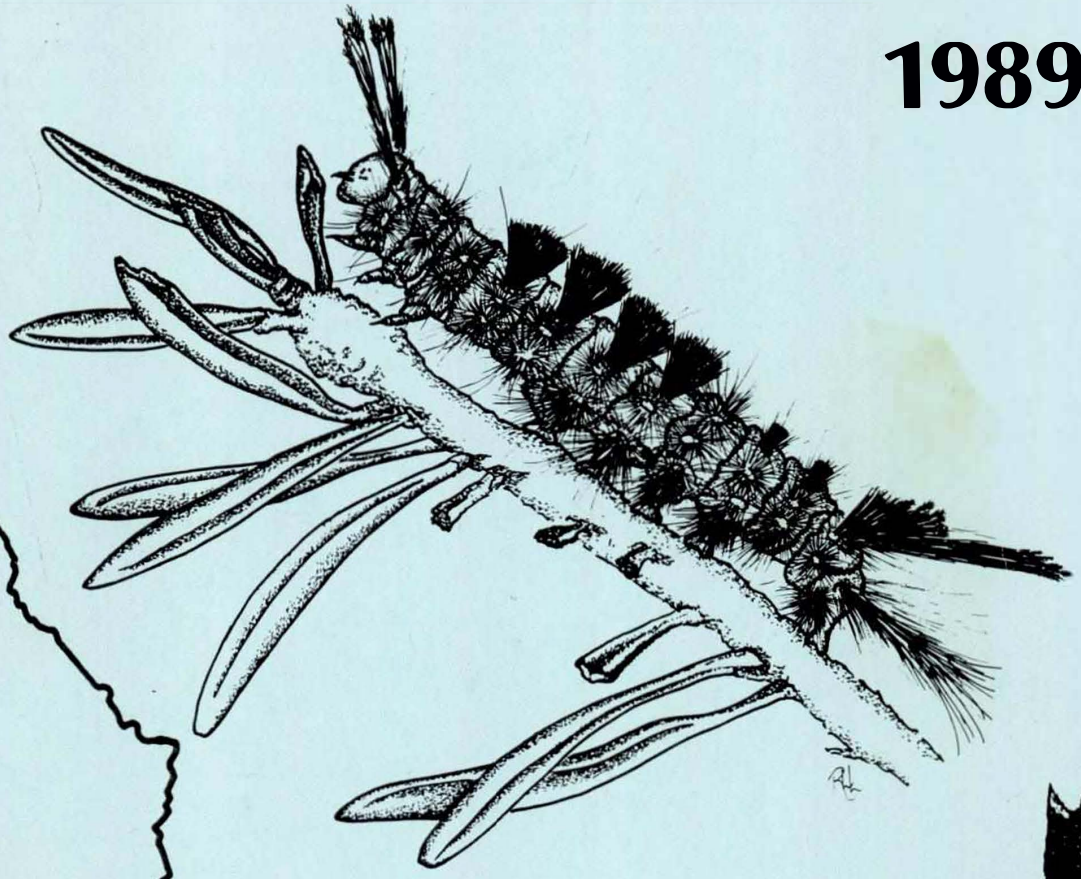
IDAHO FOREST PEST CONDITIONS & PROGRAM SUMMARY

1989



IDAHO DEPARTMENT OF LANDS

USDA FOREST SERVICE
NORTHERN AND INTERMOUNTAIN
REGIONS

Report No. 90-1

IDAHO FOREST PEST CONDITIONS
AND
PROGRAM SUMMARY
1989

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INTRODUCTION

This report summarizes major insect and disease damage on forested lands of all ownerships within the State of Idaho for 1989. Much of the information for this report was derived from aerial and ground surveys and associated detection and evaluation activities by pest management personnel within the USDA Forest Service and the Idaho Department of Lands. This report also describes several aspects of the pest management program for each of the agencies.

Losses outlined in tables are only estimates. Likewise, maps outlining areas of major insect infestations provide general locations of problems.

CONDITIONS IN BRIEF

Insects

The mountain pine beetle infestation declined slightly in both northern and southern Idaho in 1989. Douglas-fir beetle decreased by approximately 14 percent in northern Idaho but increased over 100 percent in southern Idaho. Spruce beetle mortality dropped by approximately 30 percent but is still at high levels on the Payette National Forest and adjacent lands of southern Idaho. The activity levels of the pine engraver and western pine beetle increased slightly in southern Idaho. In northern Idaho the western pine beetle increased in activity by over 1,000 percent killing over 26,500 trees in 1989. The fir engraver activity also increased very dramatically in 1989 going from only a few scattered trees to nearly 17,260 in southern Idaho and from 44,360 to 127,350 in northern Idaho.

The western spruce budworm continued at low levels in 1989 and declined even beyond the low levels of 1988. No aerially visible defoliation due to the Douglas-fir tussock moth was found in Idaho in 1989. Pheromone-baited survey traps did not catch any moths in northern Idaho, in southern Idaho the surveys indicate decreasing or static populations in most areas. Larval sampling showed suboutbreak level populations on Dewey Peak in the Owyhee Mountains. New gypsy moth populations were found outside of Sandpoint, in Idaho Falls, and a single moth was found in Pocatello. Residual populations were also found in small areas of the 1989 treatment zone in both Sandpoint and Coeur d'Alene.

Diseases

Root diseases, white pine blister rust, and several nursery diseases continue to be the most important disease problems in northern Idaho while dwarf mistletoes remain the most damaging diseases in the southern portion of the state.

Root diseases are the subject of continuing studies to gain more information on this complex group of fungi. A root disease model has been linked to the PROGNOSIS growth model and is currently being used on some national forest districts.

White pine blister rust is also receiving attention as the resistance breeding program is producing more and more resistant seed. Emphasis is now being placed on hazard rating potential planting sites and reducing potential impact in high-value stands by pruning and excising cankers.

Nearly 4,000 acres were treated for dwarf mistletoe suppression in southern Idaho last year, and over 50,000 acres received presupression surveys.

Nursery diseases are a constant concern, and new control techniques are being developed to minimize use of fungicides and fumigants.

INSECTS

BARK BEETLES

Mountain Pine Beetle

Except for widely scattered ponderosa pine mortality in the Craig Mountain Fire Protection District, mountain pine beetle-caused mortality declined throughout northern Idaho in 1989 (Table 1). Outside of the Craig Mountains reporting area, only 2,940 acres of mountain pine beetle-caused mortality was observed in northern Idaho. Most was recorded in small, scattered groups with few areas reporting groups larger than 200-300 trees.

On the Idaho Panhandle National Forests (IPNFs), 190 acres of lodgepole pine killed by the beetle was recorded on the Wallace Ranger District (RD). The Fernan RD showed 120 acres of lodgepole pine, and Bonners Ferry RD another 177 acres of lodgepole pine mortality.

The infestation on the Red River RD, Nez Perce National Forest (NF), has declined from more than 2,200 acres in 1988 to only 800 in 1989. That infestation has declined steadily for several years as lodgepole stands are brought under management.

Ponderosa pine mortality attributable to mountain pine beetle likewise declined over much of northern Idaho. The Palouse RD, Clearwater NF, showed more than 250 acres infested, but mortality totaled only 100 trees.

Even the infestation in the Craig Mountain reporting area may not have increased as much as it seems. Though total infested area for both lodgepole and ponderosa pine exceeded 12,000 acres, infestation intensity was less than one tree per acre. Where past infestations in the reporting area have centered near Soldier Meadows Reservoir, widely scattered mortality in 1989 was observed in ponderosa pine stands near Winchester and Cottonwood.

We believe the mountain pine beetle infestations in northern Idaho are still generally declining. We are not aware of actively building outbreaks in any forested areas north of the Salmon River at the present time.

In southern Idaho, mountain pine beetle activity continued to decrease (Table 1). Scattered mortality occurred throughout the host type on the Boise, Caribou, Payette, and Targhee NFs and on adjacent State and private lands. Of the total mountain pine beetle infested area in Southern Idaho in 1989, 5.3 percent was state or private ownership.

On the Challis NF, tree mortality decreased with 6,700 dead lodgepole pines detected in 1989 compared to 15,700 trees in 1988. Mortality is located along the Salmon River and adjacent drainages. Heaviest infestations occurred in the Yankee Fork and Squaw Creek drainages.

Activity declined slightly on the Salmon NF with 6,100 dying trees detected in 1989. Mortality is located along Panther Creek and other drainages adjacent to the main Salmon River.

On the Sawtooth NF, lodgepole pine mortality remained relatively static with 12,400 trees killed in 1989 compared to 11,700 trees in 1988. Decreases in activity occurred throughout the Big Wood River drainage from Ketchum north to Galena Summit and throughout the Deer Creek and Warm Springs Creek drainages. Increases in tree mortality occurred throughout the Sawtooth Valley.

Douglas-fir Beetle

Likely a result of near-normal precipitation throughout much of northern Idaho and western Montana during the winter of 1988-89 and spring 1989, Douglas-fir beetle populations declined slightly with approximately 63,500 dead trees counted in 1989 compared to 73,500 in 1988 (Table 1). The infestations, which began building in 1986, increased for three consecutive years due to unusually dry weather. In 1985, only 900 acres with faded trees had been observed in all of northern Idaho. By 1986, that had increased to 4,200 acres; in 1987 to 15,225 acres; and in 1988 had nearly doubled to 26,500 acres. More than 15,900 acres still contained recently beetle-killed trees in 1989.

The most severely affected areas are on the Wallace and Fernan RDs, IPNFs, where 2,800 and 2,500 acres, respectively, showed some level of infestation. Brood samples taken in numerous stands throughout the area indicate 1989 attacks declined substantially. Should moisture patterns remain at normal levels for the next year or so, and in the absence of new windthrow, we anticipate Douglas-fir beetle populations will return to endemic levels. Unfortunately, because of the association of Douglas-fir beetle and root disease-weakened trees, and the prevalence of root disease in second-growth Douglas-fir stands in northern Idaho, "endemic" beetle populations are still relatively high in some areas.

In 1989, the U.S. Forest Service R-1, instituted, for the first time, "bait and cut" strategies on National Forest lands, using Douglas-fir beetle pheromone tree baits, to concentrate beetles in stands scheduled for harvest on three Districts. Stands on the St. Maries RD, IPNFs, and North Fork RD, Clearwater NF, were baited and cut. On the Fernan RD, IPNFs, a replicated "pilot test" was installed. Comparing baited stands to nearby controls showed baited stands had trees attacked at rates ranging from 10 to 21 times the rate for infested, but unbaited, stands.

On State of Idaho lands there were Douglas-fir bark beetle control projects in the Priest Lake, Pend Oreille Lake and Eastern Idaho Supervisory Areas. In this combined effort 23,615 MBM of dead, green infested and non-infested Douglas-fir were removed from 4,175 acres. Douglas-fir beetle tree baits have been used regularly to attract beetles to trees prior to harvest. This has been especially useful where road rights-of-way are being cut prior to the harvest operation.

Large increases in Douglas-fir beetle activity occurred throughout all forests in southern Idaho (Table 1). On the Boise NF, approximately 72,700 trees were killed in 1989 compared to 33,800 in 1988. This is the largest Douglas-fir outbreak ever recorded on the Forest. Virtually every susceptible large stand of Douglas-fir on the Forest has significant mortality. Mortality centers range in size from 15 trees to over 1,000 trees. Beetle activity is prevelant in and around recent burns.

On the Caribou NF, approximately 19,100 dead trees were observed in 1989 compared to 5,000 trees in 1988. South of Pocatello on Bureau of Land Management, State, private, and Indian Reservation lands, approximately 12,500 trees were killed. Activity is located throughout the Caribou, Bear River, and Portneuf Ranges and in the Scout Mountain, Oxford Peak, and Samaria Mountains.

Increasing levels of Douglas-fir beetle activity were detected on all areas surveyed on the Challis NF.

Approximately 25,800 beetle-attacked trees were mapped on the Payette NF in 1989 compared to 18,900 in 1988. Heavy mortality was located in the Hitt and Cuddy Mountains, near Sturgill Peak, throughout the West Mountains, and throughout the South Fork of the Salmon River drainage. Continued beetle activity occurred in and around the French and Savage Creek burns.

TABLE 1.–IDAHO STATE-WIDE SUMMARY ANNUAL BARK BEETLE MORTALITY BY REPORTING AREA: NORTH IDAHO

		Mountain pine beetle estimated mortality			Douglas-fir beetle estimated mortality			Spruce beetle estimated mortality			Pine engraver estimated mortality			Fir engraver estimated mortality		
Area	Year	Acres infested	Trees	MBM volume	Acres infested	Trees	MBM volume	Acres infested	Trees	MBM volume	Acres infested	Trees	MBM volume	Acres infested	Trees	MBM volume
Bitterroot	1989	15	156	14.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
	1988	1,591	2,817	253.3	840	1,628	569.8	1	6	2.4	0	0	0.0	0	0	0.0
Cataldo	1989	143	232	20.9	244	775	271.3	0	0	0.0	1	10	0.3	40	169	33.8
	1988	385	1,677	149.0	479	1,863	652.0	0	0	0.0	0	0	0.0	86	65	13.0
Clearwater	1989	264	103	8.2	1,686	7,014	2,454.9	1	1	0.4	0	0	0.0	1,132	1,282	256.4
	1988	1	2	0.8	5,248	13,046	4,566.1	0	0	0.0	18	175	4.4	5,834	6,875	1,375.0
CPTPA	1989	1	10	4.0	536	2,924	1,023.4	0	0	0.0	0	0	0.0	32,996	45,560	9,112.0
	1988	1	10	0.8	2,215	5,162	1,806.7	0	0	0.0	196	890	22.3	1,309	3,934	786.8
Craig Mtns	1989	12,159	12,333	1,069.2	573	481	168.3	52	50	20.0	126	25	0.6	16,624	17,357	3,471.4
	1988	6,061	7,082	635.4	10	115	40.3	0	0	0.0	583	2,290	57.3	417	1,533	306.6
IPNFs	1989	613	1,866	170.9	10,417	41,718	14,601.3	3	19	7.6	30	205	5.1	4,340	9,524	1,904.8
	1988	776	2,713	254.2	10,231	37,265	13,042.8	0	0	0.0	25	55	1.4	542	1,305	261.0
Kendrick	1989	0	0	0.0	5	50	17.5	2	20	8.0	4,611	5,717	142.9	137	320	64.0
	1988	0	0	0.0	16	160	56.0	0	0	0.0	80	800	20.0	13,467	12,800	2,560.0
Maggie Cr.	1989	135	250	100.0	33	320	112.0	0	0	0.0	0	0	0.0	2,455	3,665	733.0
	1988	1	5	0.4	25	184	64.4	0	0	0.0	16	125	3.1	122	468	93.6
Mica	1989	21	132	11.9	79	549	192.1	0	0	0.0	1,535	2,950	73.8	5,255	8,379	1,675.8
	1988	350	404	36.1	157	1,264	442.4	0	0	0.0	1,994	5,310	132.8	3,837	7,910	1,582.0
Nez Perce	1989	813	3,400	306.0	1,755	6,426	2,249.1	249	217	86.8	1,027	1,978	49.5	911	3,919	783.8
	1988	2,895	7,100	633.6	360	1,799	629.6	0	0	0.0	744	2,255	56.4	674	2,011	402.2
Pend Oreille	1989	933	325	26.2	212	1,288	450.8	0	0	0.0	326	1,250	31.3	3,841	8,065	1,613.0
	1988	112	125	10.8	575	1,536	537.6	0	0	0.0	360	625	15.6	1,352	1,541	308.2
Priest Lake	1989	0	0	0.0	3	45	15.7	0	0	0.0	0	0	0.0	1	25	5.0
	1988	2	10	0.9	6,044	8,835	3.092.3	0	0	0.0	9	60	1.5	4	35	7.0
W. St. Joe	1989	0	0	0.0	363	1,880	658.0	0	0	0.0	1,197	1,903	47.6	21,565	29,085	5,817.0
	1988	0	0	0.0	292	719	251.6	0	0	0.0	515	1,385	34.6	6,035	5,885	1,177.0
N. Idaho Totals	1988	12,175	21,945	1,975.3	26,492	73,576	25,751.6	1	6	2.4	4,540	13,970	349.3	33,679	44,362	8,872.4
	1989	15,097	18,807	1,731.3	15,906	63,470	22,214.5	307	307	122.8	8,853	13,038	350.9	89,297	127,350	24,470.0

TABLE 1.--IDAHO STATE-WIDE SUMMARY ANNUAL BARK BEETLE MORTALITY BY REPORTING AREA: SOUTH IDAHO

		Mountain pine beetle estimated mortality			Douglas-fir beetle estimated mortality			Spruce beetle estimated mortality			Ips and WPB* estimated mortality			Fir engraver estimated mortality		
Area	Year	Acres infested	Trees	MBM volume	Acres infested	Trees	MBM volume	Acres infested	Trees	MBM volume	Acres infested	Trees	MBM volume	Acres infested	Trees	MBM volume
Boise	1989	791	880	56.3	69,231	72,729	10,327.5	175	227	108.5	59,888	42,686	426.9	41,311	17,260	3,279.4
	1988	3,568	4,443	260.6	32,836	33,759	4,793.0	155	254	121.4	46,511	32,254	322.5	0	0	0.0
Caribou	1989	378	636	40.7	23,402	31,652	4,494.6	0	0	0.0	0	0	0.0	0	0	0.0
	1988	0	0	0	17,128	20,662	2,934.0	0	0	0.0	0	0	0.0	0	0	0.0
Challis	1989	10,586	6,703	429.0	1,227	1,279	181.6	0	0	0.0	0	0	0.0	0	0	0.0
	1988	11,523	15,707	1,005.0	138	176	25.0	0	0	0.0	0	0	0.0	0	0	0.0
Payette	1989	603	367	23.5	37,711	25,779	3,660.6	26,451	32,108	15,347.6	27,151	10,476	104.8	0	0	0.0
	1988	316	517	25.9	8,669	18,857	2,677.0	36,364	44,756	21,393.4	7,426	8,829	88.2	0	0	0.0
Salmon	1989	5,859	6,111	391.1	7,929	9,708	1,378.5	0	0	0.0	0	0	0.0	0	0	0.0
	1988	4,885	7,020	449.3	818	845	120.0	0	0	0.0	1,858	1,623	16.2	0	0	0.0
Sawtooth	1989	6,630	12,399	793.5	12,362	16,052	2.279.4	0	0	0.0	0	0	0.0	0	0	.0.0
	1988	8,519	13,737	879.2	3,343	4,687	665.6	0	0	0.0	0	0	0.0	0	0	0.0
Targhee	1989	1,536	2,486	159.1	8,309	13,297	1,888.2	0	0	0.0	0	0	0.0	0	0	0.0
	1988	262	335	21.4	2,824	3,114	442.2	0	0	0.0	0	0	0.0	0	0	0.0
S. Idaho Totals	1989	29,073	41,759	2,641.4	65,756	82,100	11,656.7	36,519	45,010	21,514.8	55,795	42,706	427.0	0	0	0.0
	1988	26,383	29,582	1,893.2	160,171	170,496	24,210.4	26,626	32,335	15,456.1	87,039	53,162	531.6	41,311	17,260	3,279.4
State Totals	1988	41,248	63,704	4,616.6	92,248	155,676	37,408.3	36,520	45,016	21,517.2	60,335	56,676	776.2	33,679	44,362	8,872.4
	1989	41,480	48,389	3,624.5	176,077	233,966	46,424.9	26,933	32,642	15,578.9	95,892	67,200	882.6	130,608	144,610	28,749.4

*Summaries for south Idaho are a combination of the pine engraver (Ips), and the western pine beetle (WPB).

During 1988 on the Salmon NF, less than 1,000 trees were killed; while during 1989, 9,700 trees were killed. Increases in beetle-caused tree mortality occurred throughout the Panther Creek drainage and along drainages adjacent to the main Salmon River.

On the Sawtooth NF, Douglas-fir beetle activity increased fourfold with approximately 16,100 trees killed during 1989. Mortality is concentrated throughout drainages adjacent to the South Fork of the Boise River and along Lime Creek on the Fairfield RD. Elsewhere, extensive mortality occurred throughout the Sublett and Black Pine Mountains on the Burley RD.

On the Targhee NF, approximately 13,300 trees were killed in 1989 compared to 3,100 in 1988. Increases in mortality occurred throughout the Centennial, Big Hole, and Teton Mountain Ranges and along Big Bend Ridge.

Spruce Beetle

The primary spruce beetle activity in Idaho continues to take place in the southern part of the state on the Payette National Forest. Low levels of activity were also found in the Boise, Caribou, Challis, Salmon, and Targhee National Forests and in scattered areas of northern Idaho (see Table 1, northern Idaho).

On the Payette National Forest and adjacent state lands, approximately 32,100 trees were killed by spruce beetle during 1989, a 30 percent decrease in mortality from the 45,000 reported in 1988. Decreases in mortality occurred in commercial forest areas on the McCall, New Meadows, and Council RDs while increases in mortality occurred in remote, nonaccessible areas on the McCall RD. Salvage and sanitation programs continue in commercially accessible areas.

Pine Engraver and Western Pine Beetle

In northern Idaho, the activity level of these two insects has remained high or increased (Tables 1 and 2). The western pine beetle, specifically, has increased dramatically going from 2,599 killed trees in 1988 to 26,536 in 1989. This activity is concentrated in second-growth stands on the drier ponderosa pine sites. Some of the more significant locations of increased activity include the south side of the Spokane River between Coeur d'Alene and the Idaho/Washington border; from the southern end of Lake Coeur d'Alene extending through the pine sites to Moscow and east to Deary; along the steep slopes of the Clearwater River from Lenore upriver to Kooskia; and on the slopes and draws of the Joseph Plains area on the south side of the Salmon River.

In all of these areas, the pine engraver activity is mixed in with the western pine and is often hard to differentiate from the air. Pine engraver activity has maintained high levels of activity in 1989 with 14,038 trees killed compared to 13,970 in 1988.

In southern Idaho the combined activity levels of these two beetles, the western pine beetle and the pine engraver, has once again increased, going from 42,706 in 1988 to 53,162 in 1989, approximately a 25 percent increase (Table 1, southern Idaho). The heaviest damage is taking place in second-growth ponderosa pine stands in the Idaho City area. Extensive mortality is also continuing to occur throughout areas of recent fire activity (3-5 years), particularly in and around the Anderson Creek burn of the Boise National Forest and the French Creek burn of the Payette National Forest.

On State Endowment Lands in the Southwestern Idaho Administrative Area, 8,584 MBM of ponderosa pine was removed to help control an outbreak of the western pine beetle.

TABLE 2.--ANNUAL WESTERN PINE BEETLE MORTALITY
BY REPORTING AREA

North Idaho area	Year	Acres infested	Trees	MBM volume
Bitterroot NF	1989	0	0	0.0
	1988	0	0	0.0
Cataldo	1989	150	103	41.2
	1988	16	115	46.0
Clearwater NF	1989	72	107	42.8
	1988	5	45	18.0
CPTPA	1989	2,014	4,472	1,788.8
	1988	368	248	99.2
Craig Mtns.	1989	5,291	8,799	3,519.6
	1988	335	764	305.6
IPNFs	1989	2,269	609	243.6
	1988	5	40	16.0
Kendrick	1989	624	1,156	462.4
	1988	555	246	98.4
Maggie Cr.	1989	251	735	294.0
	1988	0	0	0.0
Mica	1989	2,944	4,865	1,946.0
	1988	791	801	320.4
Nez Perce NF	1989	3,501	3,804	1,521.6
	1988	6	31	12.4
Pend Oreille	1989	239	339	135.6
	1988	273	185	74.0
Priest Lake	1989	0	0	0.0
	1988	4	32	12.8
W. St. Joe	1989	991	1,547	618.8
	1988	10	92	36.8
N. Idaho Totals	1989	18,352	26,536	10,614.4
	1988	2,368	2,599	1,039.6

Fir Engraver

The effects of the recent drought are continuing to show up through the increased mortality of grand fir by the fir engraver in both northern and southern Idaho. In northern Idaho, 9,663 fir engraver killed trees were reported for 1987 on 2,387 acres, (4 trees/acre); 44,362 on 33,679 acres for 1988, (1.3 trees/acre); and now 127,350 on 89,297 acres in 1989, (1.4 trees/acre). The major area affected is the lower elevation grand fir types from Coeur d'Alene to Kooskia (map).

The lowering of the number of the attacked trees per acre indicates a general lowering of the resistance level of the trees. The recent 3 years of drought have affected all trees making them generally susceptible. When the trees are more resistant to attack by beetles, the attacks tend to be more clumped in local areas. However, at very low population levels the attacks tend to occur on trees that are weakened by root diseases, in which case the trees-per-acre attack density is very low. During normal precipitation periods, the fir engraver maintains a strong association with root-diseased trees. With the recent 3-year drought, we have seen an apparent reversal of this association with many attacked trees showing no obvious sign of infection by root disease.

In southern Idaho, nearly 17,300 trees were killed by the fir engraver during 1989 compared to infrequent single-tree attacks observed over the last several years. Most of the activity has occurred in federal, state, and private lands within or adjacent to the Boise National Forest. This is the first large fir engraver infestation recorded in this area. Mortality was located along Squaw Creek, near Sage Hen Reservoir, and along the North and Middle Forks of the Payette River.

Western Balsam Bark Beetle

In southern Idaho, extensive western balsam bark beetle activity occurred throughout subalpine fir stands on the Caribou National Forest (Table 1). Approximately 18,700 trees were killed on Forest Service, State, private, and Indian Reservation lands. Mortality was located south of Pocatello along the Deep Creek, Portneuf, and Bannock Ranges.

On the Sawtooth NF, approximately 5,200 subalpine trees were killed during 1989. Mortality was concentrated throughout the Albion Mountains south of Burley.

Tree mortality was scattered throughout host type on the Targhee NF with approximately 1,600 dying trees detected during aerial surveys.

DEFOLIATORS

Western Spruce Budworm

In northern Idaho, western spruce budworm defoliation decreased on the Salmon River RD, Nez Perce NF from approximately 18,700 acres in 1988 to 16,000 acres in 1989 (Table 3). Almost all of this defoliation was classified as light. Average egg mass densities collected in the area were up slightly from 2.08 per square meter of foliage in 1988 to 2.24 in 1989. Defoliation is expected to remain about the same in 1990.

No defoliation was detected on the Idaho portion of the Bitterroot NF in 1989.

Western spruce budworm pheromone traps were deployed for the first time on the Nez Perce NF as an alternate method of population monitoring. The traps are baited with a synthetic female sex pheromone and are designed to catch male moths. Trap catches will be compared with larval densities in 1990.

TABLE 3.--ACRES OF WESTERN SPRUCE BUDWORM DEFOLIATION AS DETERMINED BY AERIAL SURVEYS IN 1988 AND 1989

		----- Defoliation Intensity -----				
Forest and adjacent lands	Year	Light	Moderate	Heavy	Total	Change
Bitterroot	1988	0	0	0	0	
	1989	0	0	0	0	0
Boise	1988	180	160	0	340	
	1989	0	0	0	0	- 340
Caribou	1988	0	0	0	0	
	1989	0	0	0	0	0
Challis	1988	4,000	870	1,370	6,240	
	1989	248	0	0	248	- 5,992
Nez Perce	1988	10,570	6,260	1,850	18,680	
	1989	15,321	22	539	15,882	- 2,798
Payette	1988	0	0	0	0	
	1989	0	0	0	0	0
Salmon	1988	4,310	1,340	160	5,810	
	1989	288	0	0	288	- 5,522
Sawtooth	1988	1,170	0	0	1,170	
	1989	0	0	0	0	- 1,170
Targhee	1988	20,800	1,400	6,450	28,690	
	1989	10,340	0	0	10,340	- 18,350
Total	1988	41,030	10,070	9,830	60,930	
	1989	26,271	22	539	26,832	- 34,098

In southern Idaho, western spruce budworm activity continued to decline in extent and intensity with only 10,900 acres of light defoliation observed.

Defoliation decreased on the Challis NF from 6,200 acres in 1988 to 200 acres in 1989. Defoliation was located near Oster Gulch north of the Salmon River.

On the Salmon NF, approximately 300 acres of light defoliation were observed during 1989 compared to 5,800 acres in 1988. Defoliation was located near the Cobalt Ranger Station.

Approximately 10,300 acres of light defoliation were recorded on the Targhee NF compared to 28,700 in 1988. All defoliation mapped was classified as light. Defoliation occurred along Big Bend Ridge north of Ashton.

Larch Casebearer

Visible defoliation due to the larch casebearer was virtually nonexistent in 1989. Once again, there were obvious areas of needle diseases, but even these sites were low in acres affected.

Douglas-fir Tussock Moth

No aerially visible defoliation due to the Douglas-fir tussock moth was found in Idaho in 1989. Pheromone trapping detection surveys were conducted throughout the state.

In northern Idaho for the first time since trapping began, no moths were caught at any location (Table 4).

In southern Idaho, pheromone-baited detection traps were placed on the Boise, Payette, and Sawtooth National Forests; State and Bureau of Land Management lands around Bellevue, Idaho; and in the Owyhee Mountains of southwestern Idaho. Survey results indicate decreasing or static populations on the Boise, Payette, and Sawtooth National Forests. Trap catches increased at Little Water Gulch on the Sawtooth National Forest and remained high at Dewey Peak on Bureau of Land Management lands in the Owyhee Mountains.

Larval sampling was conducted at several sites as part of an early warning system designed to detect impending outbreaks. At the Dewey Peak site, larval populations were classified as suboutbreak. At all other sample sites, larval populations were very low.

Gypsy Moth

The gypsy moth continues to be a problem in Idaho. Detection trapping is conducted throughout the state by five cooperating agencies; the Idaho Departments of Lands and Agriculture, the USDA Forest Service Regions 1 and 4, and the Animal and Plant Health Inspection Service, PPQ Division. In 1989, all major cities and towns in Idaho were surveyed with pheromone-baited detection traps at the rate of four traps per acre. We also had traps at many campgrounds and tourist attraction sites. A total of 172 sites were surveyed using 2,248 traps. The traps were placed during the week of June 19 and checked twice in late July and mid-August for male moths then picked up near the end of September.

In our detection survey, we found moths at four new sites. One moth was trapped on the Idaho State University campus in Pocatello, seven moths were captured in a residential area of Idaho Falls, eight moths were caught in a small localized area on the east side of Sandpoint approximately two to three blocks outside of the 1989 eradication project area (see project summary), and six moths were caught in a rural area to the west of Sandpoint.

TABLE 4.--AVERAGE DOUGLAS-FIR TUSSOCK MOTH PHEROMONE TRAP CATCHES IN IDAHO, 1980-1988

Area	Number of 1989 sample plots	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
STATE AND PRIVATE											
Sandpoint	2	0	0	.1	0	0	0	0	*	*	*
Coeur d'Alene	3	0	0	1.1	3.1	4.4	8.0	7.0	.2	0	0
Plummer-Moscow	15	0	.8	8.2	12.3	17.5	85.8	22.6	1.2	.02	0
Plummer-Moscow	4	*	*	2.5	3.3	7.0	43.2	15.2	.3	0	0
Plummer-Moscow	3	*	*	*	4.3	9.0	35.2	14.6	.5	0	0
Plummer-Moscow	1	*	*	*	*	36.43	68.4	42.8	1.0	0	0
Plummer-Moscow	1	*	*	*	*	*	76.0	49.7	3.8	0	0
Plummer-Moscow	1	*	*	*	*	*	*	80.5	9.0	.2	0
Craig Mountain	7	*	2.7	.5	.5	.6	.4	3.5	.1	0	0
Deary	8	*	*	*	*	*	*	*	2.2	.02	0
NEZ PERCE NF											
Selway RD	4	.2	1.2	.7	.1	.1	0	.1	0	0.5	0.5
Slate Creek RD	3	0	1.6	2.8	.6	1.4	.3	.9	0	0	0
CLEARWATER NF											
Lochsa RD	5	*	3.6	.2	0	0	0	.3	0	0	0.2
Canyon RD	3	*	2.23	7.4	*	*	0.9	1.7	0	0	0
Pierce RD	7	*	3.6	3.0	.1	.1	.6	4.0	.1	.06	0
BOISE NF											
Cascade RD	1	*	.1	.3	20.0	0	1.0	1.2	.2	0.2	0
Mountain Home RD	1	*	*	.3	21.7	.4	0	1.2	1.4	0.6	0.2

TABLE 4.--AVERAGE DOUGLAS-FIR TUSSOCK MOTH PHEROMONE TRAP CATCHES IN IDAHO, 1980-1988, cont.

Area	Number of 1989 sample plots	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
PAYETTE NF											
Council RD	4	*	*	43.3	38.2	6.7	5.1	21.2	7.4	1.9	0.7
Weiser RD	5	*	*	43.3	42.1	8.1	4.1	15.2	5.2	0.7	0.8
SALMON NF											
North Fork RD	2	*	*	11.4	38.7	1.9	*	6.6	2.9	21.3	0.6
SAWTOOTH NF											
Fairfield RD	2	*	1.6	5.2	20.3	6.3	0	19.7	13.3	3.3	16.5
OTHER											
Owyhee Mountains	4	27.8	55.8	*	*	10.8	.6	9.4	7.8	15.8	12.8
Sharps Canyon	1	*	19.4	16.2	41.2	1.3	5.2	22.6	8.4	36.4	9.2

The two new sites in Sandpoint, along with the small residual populations in the 1989 treatment areas of both Sandpoint and Coeur d'Alene, will be proposed for continued treatment in 1990. The Idaho Falls and Pocatello sites will have a delineation trapping in 1990 to identify the source of the moths caught in 1989.

In a control effort we aerially treated 380 acres for gypsy moth in 1989; 270 acres in Sandpoint and 110 in Coeur d'Alene. We used *Bacillus thuringiensis* (Bt), a naturally occurring, soil-inhabiting bacterium. This pesticide is only active against the caterpillars of moths and butterflies. We also used a mass-trapping technique to catch moths that escaped the spray. We reduced the infested area and the population level very significantly, but were not successful in complete eradication this year.

Western Pine Shoot Borer

This year, 1989, was a continuation of control efforts for the western pine shoot borer at the Tensed and Lone Mountain ponderosa pine test plantations using the mating-disruption technique. Sex-attractant pheromone-impregnated Luretape® strips were hand tied to plantation trees at regular intervals. The artificial pheromone confuses male moths so that they cannot find females for mating. Populations have been significantly reduced as determined by counts of attacked leaders. Two more years remain in the planned treatment effort.

Sugar Pine Tortrix and Pine Needle Sheathminer

Defoliation by these two insects decreased in 1989. Scattered infestations persisted on the Boise, Payette, Sawtooth, and Targhee NFs.

Pine Butterfly

Although no defoliation from pine butterfly was noted this year in northern Idaho, large numbers of adults were observed in ponderosa pine stands around Post Falls and between Coeur d'Alene and Sandpoint. Visible defoliation may occur in 1990 in the Post Falls (Pine Villa) area.

MISCELLANEOUS INSECTS

Gouty Pitch Midge

The gouty pitch midge is still visible in test plantations at Tensed and Lone Mountain but at lower levels than previous years.

Cranberry Girdler Moth

Cranberry girdler moth pheromone traps were deployed again this year at the Coeur d'Alene nursery. Moth catches were highest during the week of July 18-24 with a total of 737 moths caught in 12 traps. The nursery was treated with diazinon, an insecticide aimed against adult moths, on June 23 and July 18. Dursban® was applied to the soil to kill larvae on September 7. Minimal girdler moth damage was noted on bareroot seedlings lifted in the fall.

Balsam Woolly Adelgid

Because of the increased balsam woolly adelgid activity found in 1988, extensive ground and aerial surveys were conducted in 1989 to determine the insect's range in northern Idaho. Numerous new infested areas were discovered on the Clearwater and Nez Perce NFs and on adjacent state and private land. Heavy adelgid populations were found on private land near Headquarters in the Scofield and Alder Creek drainages; in high-elevation subalpine fir stands near French Saddle, Hemlock Butte, and Snowy Summit on the Pierce RD, Clearwater NF; and on Coolwater Ridge, Selway RD, Nez Perce NF. Subalpine fir mortality is occurring in these

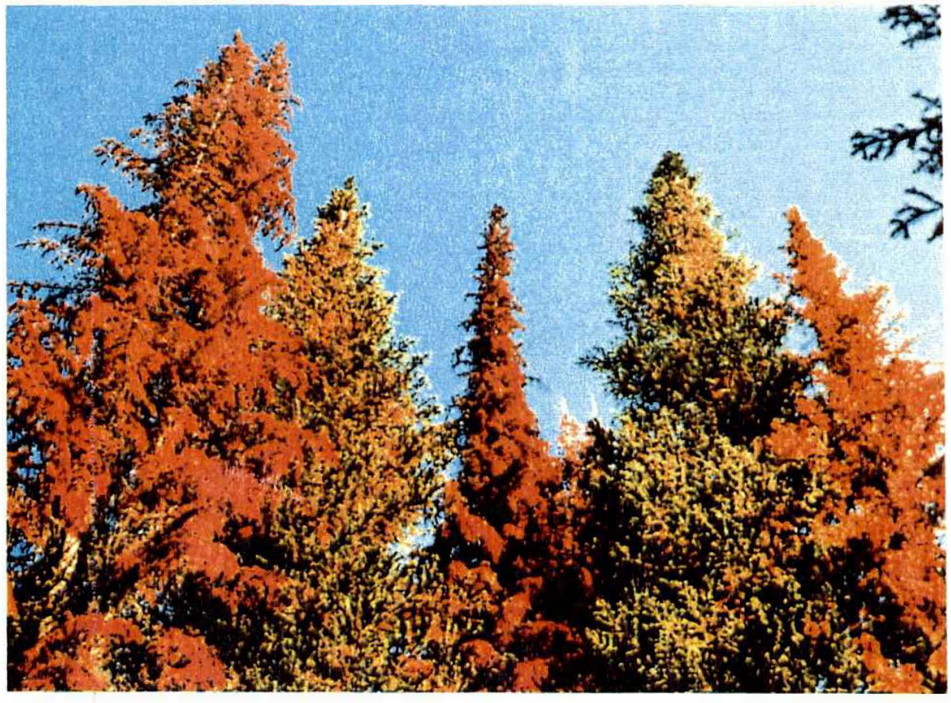
areas. New light populations were found as far east as Kelly Forks on the North Fork RD, Clearwater NF; and as far south as Elk City, Nez Perce NF. Approximately 40,000 acres of adelgid caused subalpine fir mortality was noted from the air with most of the activity occuring on the Clearwater NF and adjacent lands. Much of the mortality occurred in high-elevation subalpine fir stands. Adelgid populations continued on grand fir located adjacent to infested subalpine fir. No grand fir mortality was observed.

The large increase of adelgid populations over the past few years is probably due to the unusually mild winters and long, dry summers of 1986-1988. As weather conditions return to normal, adelgid populations are expected to stabilize.

Permanent plots established in subalpine fir stands in 1986 and grand fir stands in 1988 are being monitored annually to determine the rate of insect spread locally and the rate of tree mortality. Heavy adelgid populations on the stems of subalpine fir can kill trees in 3 years. Early crown symptoms of infested trees are yellowing inner branches resulting in poor growth. As adelgid populations increase on the tree, red-flagged branches appear throughout the crown or the entire crown will turn yellow and then red in a short time. Fading can occur fairly quickly as indicated by Figures 1a and 1b. These photos were taken of the same trees 48 days apart during late summer.

Figure 1.--Subalpine fir killed by the balsam woolly adelgid.

a. Photo taken August 11, 1989



b. Photo taken September 28, 1989

Cone and Seed Insects

The Moscow White Pine Arboretum was sprayed with the insecticide Pydrin® in early June to control cone and seed insects, primarily coneworms. A near record high of 1,500 bushels of cones were harvested from the Arboretum in 1989. Predictions for 1990 are 800-1,000 bushels.

The western conifer seed bug was controlled at the Coeur d'Alene seed orchard with one application of Pounce® applied August 1-3. The cone crop exceeded predictions with 903 bushels harvested in 1989.

The Sandpoint seed orchard produced 671 bushels of cones in 1989.

The Lone Mountain seed orchard produced 138 bushels of cones in 1989.

Forest Tent Caterpillar

Populations were generally low throughout most of Idaho. Localized outbreaks did occur in high-elevation alder patches in the upper reaches of the North Fork of the Clearwater River. The caterpillars exhibited a unique behavior in that many left the host plant and crawled into subalpine fir trees to pupate. Many of these trees had large clusters of cocoons congregated in the upper 10 feet of the crown. These white masses of cocoons could be noticed from a considerable distance.

California Tortoiseshell

Several large patches of ceanothus defoliated by caterpillars of the California Tortoiseshell were found in the Clearwater drainage of Clearwater County and in the Pack River drainage of Boundary County. The observers were impressed by the quiet "rattling" noise caused by the pupae shaking their bodies together when disturbed. Residents of Sandpoint observed several migratory flights of adults moving through the area.

Locust Borer

The locust borer continues to kill black locust trees in Boise.

Spruce Bud Scale

Infestations of spruce bud scales have been detected on ornamental spruces scattered throughout northern and southern Idaho.

Alder Flea Beetle

Alder defoliation caused by the alder flea beetle was again observed between Coeur d'Alene and Sandpoint and in some areas near Moscow. Populations appear to have declined from last year.

In southern Idaho, alder defoliation was noted in the Mann Creek drainage on the Payette NF.

DISEASES

This narrative is divided into two sections. The first section describes unusual diseases and disease problems which have changed significantly during 1989. Since our most damaging disease problems continue to cause widespread problems over much of the same area every year, they are only briefly mentioned in this section.

However, root diseases, dwarf mistletoes, white pine blister rust and nursery diseases are the subject of continuing study and the second portion of the narrative briefly describes current projects dealing with these diseases.

The narrative is followed by a table summarizing all disease problems observed in 1989.

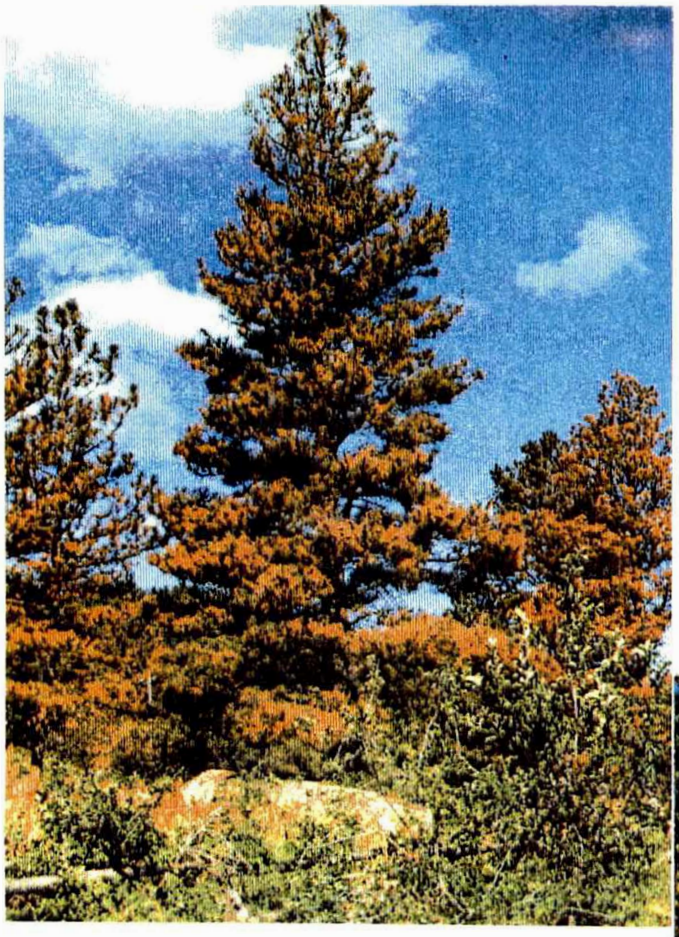
Brief Review of Changes or Unusual Disease Problems Observed in 1989

The disease picture was complicated by the continued drought conditions and related bark beetle outbreaks, and the extreme cold weather last February.

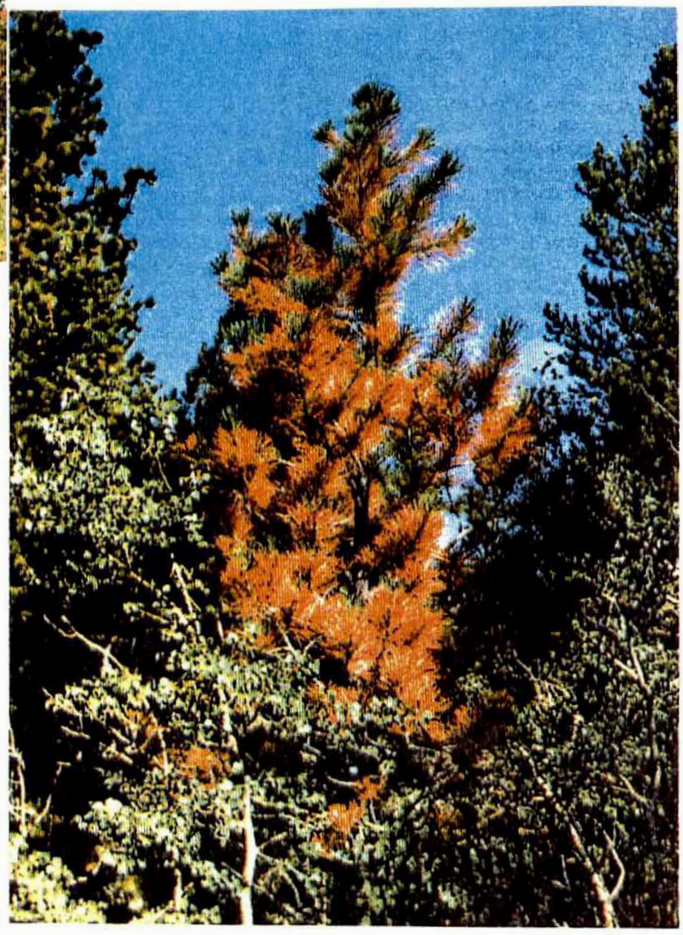
ABIOTIC PROBLEMS

The arctic cold storm in February caused widespread winter damage throughout the state. Marginally acclimated ornamentals in urban settings were especially hard hit, but native conifers which have been stressed by 3 years of drought also suffered. Damage ranged from minor needle kill to complete mortality of groups of trees of all sizes. Entire stands in Montana turned red (Figure 2), while the most severe damage in Idaho occurred on approximately 24,100 acres of lodgepole pine in the Island Park and Teton area in eastern Idaho.

Figure 2.--Winter damage on ponderosa pine in western Montana and parts of eastern Idaho



a. Winter damage in extension areas of Montana and eastern Idaho.



b. Typical winter-damaged trees in northern Idaho.

A western larch tree improvement plantation near Bonners Ferry exhibited terminal damage especially on terminals that were above snowline. Scattered western redcedar mortality near Orofino that had no obvious pest problems may have been the result of drought and winter weather.

A severe hail storm extensively defoliated about 2,300 acres of subalpine fir west of the Cascade Reservoir south of McCall last spring.

STEM AND BRANCH DISEASES

Cytospora Canker of True Firs

Investigation of "branch flagging," dead and dying branches on subalpine fir in central and eastern Idaho revealed cankers typical of this disease. The widespread occurrence is probably a result of the prolonged drought weakening trees to the point where they are susceptible to this normally weak parasite. Since high levels of this disease often precede attack by the western balsam bark beetle, increasing beetle-caused mortality in subalpine fir can be anticipated in infected areas.

Dwarf Mistletoe

Dwarf mistletoe management considerations are generally included in forest plans, and emphasize management of the parasite through conventional forest management practices. This is reducing the need for supplemental projects to sanitize previously harvested stands, or areas ravaged by bark beetles, where infected trees remain and now threaten the new regeneration. Accomplishments for 1989 are reported in Table 5.

Douglas-fir dwarf mistletoe was found in the Albion Mountains, Black Pine Range, and Sublett Range in south central Idaho during an extensive forest-wide disease survey of the Sawtooth NF. This is the first report of this dwarf mistletoe species in these areas. Lodgepole pine dwarf mistletoe was also found in the Sublett Range for the first time. The frequency of occurrence of both mistletoe species was very low.

TABLE 5.--*DWARF MISTLETOE* ACCOMPLISHMENTS - SOUTHERN IDAHO, 1989

National Forest	Presuppression	Project Acres
Boise	44,200	200
Caribou	10,600	92
Challis	90	140
Payette	0	400
Salmon	0	219
Sawtooth	0	27
Targhee	0	500
Total	54,890	1,578

ROOT DISEASES

Root diseases continue to be the primary disease concern at many northern Idaho locations and are becoming the subject of more and more studies. Please check the project summaries in the following pages for the current status of these projects.

FOLIAGE DISEASES

The epidemic of Douglas-fir needle cast noted throughout southern Idaho in 1988 subsided greatly in 1989. Other needle casts continue to be at low levels as a result of dry weather conditions which are not conducive to most needle diseases.

In spite of dry weather, larch in many localized areas had varying amounts of discolored foliage during the summer. In many cases a variety of insect problems were also present. Some of the most severe damage along the Pend O'Reille River and near Heyburn State Park appeared to be due primarily to the larch sawfly.

VASCULAR WILTS

Dutch elm disease continues to slowly remove elms in Boise. In 1989, 41 infected trees were removed.

NURSERY DISEASES

Winter injury was found on white pine seedlings at the USDA Forest Service in Coeur d'Alene. Most affected seedlings sustained varying amounts of needle loss, but were not killed and produced new healthy growth.

Phoma blight was detected at several bareroot nurseries, occurring on a number of different pine hosts, including Japanese black pine being grown for ornamentals. *Phoma* spp. are common soil inhabitants and may be deposited on seedling foliage during rain or irrigation. Once on the foliage, the fungus rapidly penetrates host tissues, often causing a top dieback. Damage is usually sporadic and scattered throughout seedbeds.

A *Phytophthora* sp. (a soil-borne fungus commonly associated with poorly drained areas) was isolated from bareroot spruce seedlings at a central Idaho nursery. Identity of the species involved is not known. Damaged seedlings were concentrated in low, poorly drained portions of seedbeds.

A young plantation of transplanted larch at the USDA Forest Service nursery in Coeur d'Alene sustained unusual groups of mortality. Root collar tissues were dead, and isolations found *Phytophthora cactorum* (an important pathogen of many agricultural crops). Pathogenicity tests are planned and the plantation will be monitored for one more year.

ANIMAL DAMAGE

Bear damage resulted in serious losses of larch and ponderosa in many 10- to 20-year-old plantations in northern Idaho. Continued damage is anticipated in understocked stands in portions of the Sundance burn which were finally becoming regenerated.

SUMMARY OF PATHOLOGY PROJECTS

ROOT DISEASES

Annosus root disease

A new project was initiated to examine the occurrence and potential role of Annosus root disease in Douglas-fir/grand fir stands in the Nez Perce NF. This will be the subject of a cooperative education project with Oregon State University.

Armillaria root disease

Permanent plots have been established in root-diseased stands at a number of locations in the Region. These are examined at 1- to 5-year intervals. Plots in thinned and unthinned commercial stands received a 15-year remeasurement and will be analyzed to look at effects of commercial thinning on root disease on the Idaho Panhandle NFs (Fernan RD). Data summaries support the contention that Douglas-fir is the most damaged species.

Permanent plots in Alder Creek, Idaho Panhandle NFs, Fernan RD, were thinned in 1989 and will be monitored to evaluate the effects of thinning on root disease mortality. Plots in Hell Roaring and Charity Creek, Flathead Indian Reservation in Montana, received an 8-year evaluation.

Over 600 acres of 10- to 20-year-old ponderosa pine plantations in the Rathdrum Prairie were re-examined for root disease in 1989. Losses from Armillaria continue to be about 2-3 percent per year and are still limited to improperly planted trees.

In a cooperative project with the Intermountain Research Station, 10 tenth-acre plots were established in 1988-89 to monitor the effects of different fertilizers on Armillaria in thinned Douglas-fir stands. Plots were fertilized and intensively sampled last spring for Armillaria. Nearly 250 cultures were obtained from infected trees, rotten wood, and rhizomorphs to help "pedigree" the Armillaria species present. Foliage samples were collected to analyze nutrient composition of infected and uninfected trees in the different fertilizer treatments. All plots were stem mapped and analyzed with a ceptometer to measure the amount of crown closure. The crown of each tree was measured and boles were increment bored for growth rates. The electrical resistance of each tree was also tested with a shigometer to compare with vigor ratings.

Armillaria/Phellinus root diseases

A 5-year evaluation of 110 plots in root disease pockets in six commercial-sized stands in northern Idaho were analyzed. Results show losses in volume increased at a rate of 5-6 percent per year (equivalent to 1,100 BF/Ac/Yr). In this 5-year period, 25 percent of all Douglas-fir died and 41 percent of the remaining live trees were infected (see Schwandt, 1989).

Risk-Rating in the Lolo NF

Nearly 20 percent (300,000 acres) of the commercial forest on the Lolo NF contained root disease and 1.2 percent was in nonstocked patches. A risk-rating system predicted a high probability (59 percent) of root disease in grand fir and western hemlock habitat types and in other habitat types on moderate slopes with southernly aspects (48 percent). In much of this area, fire control selective cutting practices and the introduction of white pine blister rust have created dense stands of mostly Douglas-fir which are now being severely infected with root disease.

Root disease model

The root disease model is now fully operational for northern Idaho stands. It has had substantial updates, improvements and revisions, and will be added to the latest release of the Prognosis model (ver. 6.0) to be released in the spring of 1990. Assistance on model use is available through the Missoula FPM office. In areas where root disease is a problem, the root disease model is producing very different results than the straight Prognosis runs, and appears to be giving a more realistic projection.

Horizon EIS

Stands in the Wolf Creek drainage, "horizon," of the Fernan RD are being analyzed with a combination of the root disease and watershed models. This is the first time that the root disease model has been used to provide input to impact statements with other resources. The entire area was also digitized to allow for GIS system analysis. The watershed models in this area are based on the amount of open areas which would contribute to stream degradation during "rain on snow" events. These models generally show that "no action" will result in decreased open space or at least a maintenance of water quality. The root disease model showed that stands with high amounts of root disease would actually result in more open space (and more potential for runoff) than areas with some intermediate cutting and replanting of less susceptible species. Timber supply from these areas also indicates long-term losses if no action is taken. Even in areas of light root disease infection levels, significant losses were projected to occur within 40 years.

Dwarf Mistletoes

Permanent plots established 20 years ago in Douglas-fir and lodgepole pine infected with dwarf mistletoe in Montana received a 5-year remeasurement. Trends observed 5 years ago (reported by Oscar Dooling: Rept. 86-6) are unchanged. The 21 percent loss in diameter growth by Douglas-fir has not changed significantly over the last 5 years. The lodgepole pine were only lightly infected and still do not show any growth reduction. There were no significant growth losses in trees with dwarf mistletoe ratings of 3 or less.

An evaluation was conducted for dwarf mistletoe in lodgepole pine on the Targhee NF that had been thinned in 1983. Sixteen 100-tree plots were analyzed to examine effects of dwarf mistletoe on lodgepole pine spaced to different thinning regimes.

Final evaluation is being completed on a 2-year study in the Boise NF to determine the effectiveness of the chemical growth regulator, ethephon. When this chemical is sprayed on dwarf mistletoe plants, they shrivel and fall off the branches. However, the "roots" remain alive and slowly resprout. Since the dwarf mistletoe shoots produce the seeds, if they can be killed back for a period of time, may result in a slower spread of the disease.

White Pine Blister Rust

The white pine blister rust management guideline publication is now available through the FPM offices listed in this publication, (*White pine blister rust in northern Idaho and Western Montana: alternatives for integrated management*). This publication gives the most current guidelines for selecting levels of resistant stock and determining rust index and rust status, as well as information regarding ribes management.

Several new pruning and excising projects were completed in precommercial-sized stands, and rust status surveys were conducted on several hundred acres of 15- to 30-year-old white pine stands.

Surveys of white pine plantations were continued to monitor how rust resistance is holding up in the field. Twenty-six stands were surveyed in 1989 and are being evaluated. One plantation which had been

planted with F1 stock was nearly a total failure. This stand had actually been planted once before with the same level of resistant stock. Investigations found that the rust hazard for the site was too high for this level of stock and should have either received F2 stock or white pine should not have been attempted. This points out the importance of hazard rating sites before planting, in order to determine what level of resistant stock needs to be used.

The USDA Forest Service and cooperators are continuing to select and screen for rust resistance in seedlings. A primary tool used in the selection process is to inoculate seedlings with blister rust spores and monitor them for infection. This used to be accomplished by hanging infected Ribes leaves above the seedlings, but it was difficult to be sure that all seedlings were getting an equal load of spores. Development of a procedure is underway to spray the seedlings with a solution of basidiospores which insure consistent coverage.

Foliage Disease

Elytroderma needle disease in ponderosa pine are being monitored in two areas in southern Idaho. Plots established in 1986 were remeasured and augmented by 50 individually marked trees in both the Idaho City and Cascade areas. Although little mortality has occurred, heavily infected trees continue to be heavily infected while some moderate and lightly infected trees appear to be recovering. Several individual branches with heavy infections have died.

Nursery Diseases

Fusarium diseases are usually controlled in bareroot nurseries by soil fumigation. Basamid granular has recently been tried in many nurseries throughout the U.S. This chemical is effective in reducing populations of potential pathogens, but does not penetrate soils as deeply as methyl bromide/chloropicrin which has been used in the past. Basamid may also be phytotoxic to any seedlings growing nearby, especially western white pine.

Recent evaluations have shown that contaminated styroblock and pine cell containers are often important sources of *Fusarium* inoculum. Standard steam cleaning usually does not adequately reduce this contamination. However, immersion in hot water (68 degrees C for 10 minutes) was effective in greatly reducing *Fusarium* contamination of styroblock containers. Sodium metabisulfite has also shown promise, particularly at a 5 percent concentration in which containers are dipped for 30 seconds. However, effects on seedling production are currently unknown, but will be determined.

An evaluation to determine the fate of *Fusarium* on the roots of outplanted container-grown Douglas-fir seedlings has indicated that *Fusarium* spp. were still present on seedling roots even after three growing seasons. However, these fungi were mostly limited to old "plug" roots and were not detected on new roots which had egressed from plugs.

The effects of granular Basamid fumigant was monitored on three genera of conifer seedling root pathogens at the Lucky Peak Nursery. There were wide variances in population levels of *Fusarium* spp., *Pythium* spp., and *Phytophthora* spp. especially between fields. While post-fumigation levels of all three groups of fungi were sufficiently reduced initially, *Fusarium* spp. populations resurged to levels comparable to control plots within 2 months.

Status of Chronic Disease Problems

Disease	Host	Location/Remarks
STEM AND BRANCH DISEASES		
Aspen trunk rot	Aspen	Common in most aspen stands (worse with age).
Atropellis canker	Lodgepole pine	Found in pockets in pole-sized stands causing defect, topkill, and mortality.
Comandra blister rust	Lodgedpole pine ponderosa pine	Most common in southern Idaho; may be locally severe.
Cytospora canker	Subalpine fir	Widespread branch flagging in south and east Idaho; may predispose trees to bark beetle attack.
Diplodia blight	Ponderosa pine	Has been associated with branch dieback in many Idaho areas.
Dwarf mistletoe	Douglas-fir, western larch, lodgepole and ponderosa pines	Widespread and damaging throughout the state; see Table 5 for summary of suppression projects.
Indian paint fungus (decay)	True firs, hemlock	Causes 90 percent of decay in these species; especially as age increases beyond 60 years.
Red ring rot	Western larch, pines, Douglas-fir, true firs, spruce	Serious decay problem in mature conifers.
Stalactiform rust	Lodgepole pine	Heavy infection has been observed in localized areas of the Sawtooth NF.
Western gall rust	Lodgepole and ponderosa pine	Occurs throughout range of hosts; infection levels are highly variable.

Disease	Host	Location/Remarks
ROOT DISEASES		
Annosus root disease	Pines, true firs, Douglas-fir	Causes mortality, root and butt rot of ponderosa pine, especially in young pine near old stumps; other species are affected in southern Idaho mized conifer stands.
Armillaria root disease	Douglas-fir, grand fir,	A widespread primary killer of Douglas-fir and true firs, and young trees of other species.
Black stain root disease	Pines, Douglas-fir	Found infrequently in north Idaho; found on pinyon pine on the BLM Burley District, Idaho.
Laminated root rot	Douglas-fir, true firs, occasionally other conifers	Primary killer in many pockets in north Idaho; may be mixed with Armillaria or other root pathogens.
Schweinitzii root rot	Douglas-fir, pines	Common in mature and overmature forests; frequently associated with other root diseases and bark beetles.
Tomentosus root disease	Douglas-fir, spruce, subalpine fir	Commonly found with *P. schweinitzii* as a root/butt rot in south Idaho; occasionally causes mortality.
FOLIAGE DISEASES		
Rhabdocline needle cast	Douglas-fir	Very widespread but very light levels statewide, even in south and east Idaho where high levels occurred in 1988.
Swiss needle cast	Douglas-fir	Widespread but at low levels of infection throughout range north Idaho.
Elytroderma needle cast	Ponderosa pine	Widespread throughout the state but more prevalent in drier climates; see project summary.

Disease	Host	Location/Remarks
FOLIAGE DISEASES, cont.		
Fir broom rust	True firs	Widespread throughout the state; usually of little consequence but severely infected stands were observed south of Twin Falls and Burley, Idaho.
Fir needle cast	Subalpine fir	Several infections were observed on small trees at higher elevations near McCall.
Larch needle cast and blight	Larch	Both diseases occur throughout Idaho; relatively low incidence in 1989 except localized areas in norther Idaho where mixed with insect problems.
Lodgepole pine needle cast	Lodgepole pine	Observed only in scattered areas of light intensity in southwest Idaho in 1989.
Marssonina blight and Shepard's Crook	Aspen	Scattered incidence of light to heavy intensity throughout most of host range.
Spruce broom rust	Engelmann spruce	Scattered through host range; most common in eastern Idaho
NURSERY DISEASES		
Cylindrocarpon	Especially white pine	Common in soil or contaminated containers, usually a saprophyte but may be a weak parasite.
Diplodia tip blight	Especially pines	Low levels in areas with a history of problems.
Fusarium root disease	Douglas-fir, larch, spruce, others	Very common nursery problem; may be carried on soil or containers; minor mortality of 1-0 and 2-0 conifer seedlings at Lucky Peak Nursery.

Disease	Host	Location/Remarks
NURSERY DISEASES, cont.		
Grey mold	Most conifers, especially larch, spruce	Common at low levels at many nurseries.
Meria needle cast	Larch	At very low levels this year.
Phoma blight	Most pines	Found on seedlings and soil isolations at Lucky Peak Nursery.
Phytophthora/pythium root rot	Spruce	Found on bareroot spruce in poorly drained areas.
Sirococcus tip blight	Spruce, pines	Low levels at several nurseries.

APPENDIX

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Philip J. Mocettini Jr.	Biological Technician
Marianne Rowe	Secretary

COMMON AND SCIENTIFIC NAMES of INSECTS AND DISEASES

Insects

Common Name	*Scientific Name*
Alder flea beetle	*Altica ambiens* LeConte
Balsam woolly adelgid	*Adelges piceae* (Ratzeburg)
California tortoiseshell	*Nymphalis californica* (Boisduval)
Cone moth	*Eucosma recissoriana* Heinrich
Cone worms	*Dioryctria* sp.
Cranberry girdler moth	*Chrysoteuchia topiaria* (Zeller)
Douglas-fir beetle	*Dendroctonus pseudotsugae* Hopk.
Douglas-fir tussock moth	*Orgyia pseudotsugata* McDunnough
Forest tent caterpillar	*Malacosoma disstria* Hubner
Fir engraver	*Scolytus ventralis* LeConte
Gouty pitch midge	*Cecidomyis piniopsis* O.S.
Gypsy moth	*Lymantria dispar* (L.)
Larch casebearer	*Coleophora laricella* (Hub.)
Locust borer	*Megacyllene robiniae* (Foster)
Mountain pine beetle	*Dendroctonus ponderosae* Hopk.
Pine butterfly	*Neophasia menapia* (Felder & Felder)
Pine engraver	*Ips pini* (Say)
Pine needle sheathminer	*Zelleria haimbachi* Busck.
Spruce beetle	*Dendroctonus rufipennis* (Kirby)
Spruce bud scale	*Physokermes piceae* (Schrank)
Sugar pine tortrix	*Choristoneura lambertiana* (Busck.)
Western conifer seedbug	*Leptoglossus occidentalis* Heidmann
Western pine beetle	*Dendroctonus brevicomis* LeConte
Western pine shootborer	*Eucosma sonomana* Kearfott
Western spruce budworm	*Choristoneura occidentalis* Freeman

Diseases

Common Name	*Scientific Name*
Annosus root disease	*Heterobasidion annosum* (Fr.) Bref.
Armillaria root disease	*Armillaria ostoyae* (Romagn.) Herink
Atropellis canker	*Atropellis piniphila* (Weir) L. & H.
Black stain root disease	*Leptographium wagneri* (Kendr.) Wingf.
Brown cubical butt rot	*Phaeolus schweinitzii* (Fr.) Pat.
Cylindrocarpon root disease	*Cylindrocarpon* spp.
Diplodia tip blight	*Sphaeropsis sapinea* (Fr.) Dyko
Dutch elm disease	*Ceratocystis ulmi* (Buism.) C. Mor.
Dwarf mistletoes	*Arceuthobium* spp.
Elytroderma needle cast	*Elytroderma deformans* (Weir) Dark.
Fir broom rust	*Melampsorella caryophyllacearum* Schroet.
Fusarium root disease	*Fusarium* spp.
Grey mold	*Botrytis cinerea* Pers. ex Fr.
Indian paint fungus	*Echinodontium tinctorium* (Ell.& Ev.) Ell. & Ev.
Laminated root rot	*Phellinus weirii* (Murr.)Gilb.
Lodgepole pine needle cast	*Lophodermella concolor* (Dearn.) Dark.
Meria needle cast	*Meria laricis* Vuill.
Phoma blight	*Phoma* spp.
Red ring rot	*Phellinus pini* Pilat.
Rhabdocline needle cast	*Rhabdocline pseudotsugae* Syd.
Sirococcus tip blight	*Sirococcus strobilinus* Preuss.
Swiss needle cast	*Phaeocryptopus gaumanni* (Rhode) Pet.
Tomentosus root disease	*Inonotus tomentosus* (Fr.) Gilb.
Western gall rust	*Endocronartium harknessii* (Moore) Hir.
White pine blister rust	*Cronartium ribicola* Fisch.

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DOUGLAS-FIR BEETLE
WESTERN PINE BEETLE
PINE ENGRAVER BEETLE
MOUNTAIN PINE BEETLE
BALSAM WOOLLY ADELGID

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